

# PATENT ABSTRACTS OF JAPAN

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## (54) OPTICAL DISK DEVICE

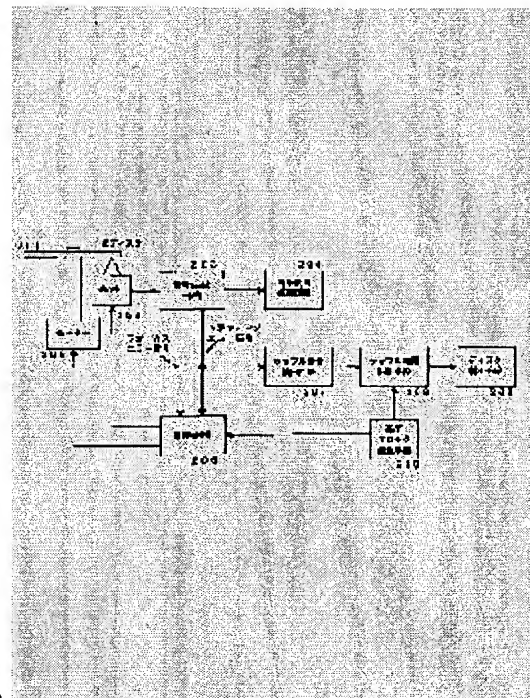
### (57)Abstract:

PROBLEM TO BE SOLVED: To enable discriminating of the class of a disk in the midst of the starting up of an optical disk device without reproducing a signal by extracting a wobbling component from the optical disk and discriminating two kinds of optical disks in accordance with results measured by a measurement means for measuring the cycle of wobbles.

SOLUTION: A wobble signal extracting circuit 207 restricts a band by a band-pass filter in order to pass a prescribed band to eliminate components other than the band. After the circuit 207 has extracted this wobble component, it binarizes the component and the cycle of the wobbles is measured with a counter by eliminating the area of addresses from the wobble component with a

reference clock, for example, the clock of 29.2 mHz by a wobble cycle measuring means 208.

At this time, when an optical disk 201 is a DVD 2.6 GB, the count value of the counter becomes about 186 counts and when the disk is a DVD 4.7 GB, the count value becomes about 124 counts. Then, a disk discriminating means 209 discriminates the class of the disk by these count values.



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CLAIMS

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[Claim(s)]

[Claim 1] Have a spiral-like guide rail and to said guide rail with the optical disk which gave wobbling of the period of the integral multiple of a data transfer rate The Mitsuteru gunner stage which has the function which plays both the optical disks that are two kinds from which the period of said wobbling furthermore differs, and irradiates laser light at the recording surface of said optical disk, The control means controlled to condense the light which said Mitsuteru gunner stage irradiates on an optical disk, and to scan said guide rail, A signal-processing means to reproduce a signal from said optical disk, and a wobble extract means to extract said wobbling component, The optical disk unit characterized by having had a measurement means to measure the period of said wobble, and having a distinction means to distinguish said two kinds of optical disks, according to the result which said measurement means measured.

[Claim 2] Have a spiral-like guide rail and to said guide rail with the optical disk which gave wobbling of the period of the integral multiple of a data transfer rate The Mitsuteru gunner stage which has the function which plays both the optical disks that are two kinds from which the period of said wobbling furthermore differs, and irradiates laser light at the recording surface of said optical disk, A migration means to move said Mitsuteru gunner stage to the location of the radial arbitration of said optical disk, The control means controlled to condense the light which said Mitsuteru gunner stage irradiates on an optical disk, and to scan said guide rail, A signal-processing means to reproduce a signal from said optical disk, and a wobble extract means to extract said wobbling component, Have a measurement means to measure the period of said wobble, and said optical disk is rotated at a predetermined rotational frequency. The optical disk unit characterized by having a distinction means to distinguish said two kinds of optical disks, according to the result which said migration means moved said Mitsuteru gunner stage to the position, and said measurement means measured.

[Claim 3] The optical disk unit which it has an out-of-band removal means to extract the wobbling component of said optical disk, is before and after distinction by said distinction means, and is characterized by changing the band of said out-of-band removal means.

[Claim 4] The optical disk unit which has the configuration indicated to claim 1 or claim 2 characterized by changing the property or the control approach of said signal-processing means according to said distinguished optical disk distinction result.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention belongs to the field about an optical disk unit.

[0002]

[Description of the Prior Art] Many media based on the specification of DVD are proposed these days when DVD spreads quickly. DVD-RAM2.6GB in which DVD-R in which 1-time record is possible and repeat record are possible as an example in it, DVD-RAM4.7GB, etc. are raised.

[0003] When reproducing the media of these many with one equipment, it is necessary to reproduce by the optical head control suitable for each, or the signal-processing method. In order to realize it, it is necessary to distinguish what the disk is to the disk inserted first.

[0004] Conventionally, after this means to identify measured the reflection factor of a disk and performed a certain amount of classification reason, it actually tried playback and it was common to have performed to distinguish a disk by reading CDC which shows the disk classification currently recorded on whether to have been reproducible and or not a disk.

[0005]

[Problem(s) to be Solved by the Invention] By the above-mentioned conventional approach, great time amount occurs in disk distinction, and the technical problem that equipment warm-up time will increase occurs.

[0006]

[Means for Solving the Problem] The optical head which irradiates laser light in this invention at the recording surface of an optical disk in order to solve the above-mentioned technical problem, The control means controlled to condense the light which the Mitsuteru gunner stage irradiates on an optical disk, and to scan a guide rail, In the configuration equipped with a signal-processing means to reproduce a signal, a wobble-extract-means to extract a wobbling component, and a measurement means to measure the period of said wobble, said two kinds of optical disks are distinguished from an optical disk according to the result which said measurement means measured.

[0007] Or an optical disk is rotated at a predetermined rotational frequency, said optical head is moved to a position, and said two kinds of optical disks are distinguished according to the result which said measurement means measured.

[0008] Moreover, before having an out-of-band removal means to extract the wobbling component of an optical disk and specifying said optical disk, after appointing the band of an out-of-band removal means at passing the component of two kinds of said wobbling periods at least and specifying said optical disk, an out-of-band removal means is narrow-band-ized so that only the component of the wobbling period of the specified disk may be passed.

[0009]

[Embodiment of the Invention] Hereafter, the example of this invention is explained.

[0010] First, the 1st example of this invention is explained to a detail.

[0011] Drawing 1 is the wave form chart showing the wobble signal of DVD-RAM2.6GB and DVD-

RAM4.7GB generated from a tracking error signal.

[0012] In drawing 1, 101 and 103 are the addresses of DVD-RAM2.6GB and DVD-RAM4.7GB, respectively, and 102 and 104 are the wobble signals of DVD-RAM2.6GB and DVD-RAM4.7GB, respectively.

[0013] Moreover, both DVD-RAM2.6GB and DVD-RAM4.7GB are ZCLV formats, and the channel rate of the criterion in a zone 0 is about 58.4MHz in about 29.2MHz and DVD-RAM4.7GB at DVD-RAM2.6GB. Moreover, DVD-RAM2.6GB is [ about 39.78Hz and DVD-RAM4.7GB of the rotational frequency at that time ] 54.10Hz. DVD-RAM2.6GB is [ 38.068-40.486 micrometers and DVD-RAM4.7GB of the physical die length of the wobble in this zone 0 ] 26.04-27.094 micrometers.

[0014] The detail of a physical format of these disks of DVD-RAM2.6GB and DVD-RAM4.7GB is indicated by each specification document (DVD SYSTEM SPECIFICATIONS and PHYSICAL SPECIFICATIONS Version1.0 and Version1.9).

[0015] Drawing 2 is the block diagram showing the configuration of the optical disk unit which realizes optical disk distinction concerning the 1st example of this invention.

[0016] In drawing 2 201 The optical disk of DVD-RAM2.6GB or DVD-RAM4.7GB, The signal generation circuit where 202 generates an optical head and 203 generates a tracking error signal, a focal error signal, etc., A regenerative-signal processing means by which 204 reproduces a signal, the motor which 205 makes rotate an optical disk 201, The control means by which 206 controls the optical head 202 and a motor 205, The wobble signal extract circuit which extracts the wobble signal with which 207 appears in a tracking error signal, A wobble period measurement means to measure the period of the wobble from which the wobble extract circuit 207 extracted 208, A disk distinction means by which 209 distinguishes a disk according to the result of the wobble period measurement means 208, and 210 are reference clock generating means to supply a clock to a control means 206 and a wobble period measurement means.

[0017] Below, the flow of a signal is explained based on drawing 2.

[0018] An optical disk 201 is rotated by the motor 205, a control means 206 controls the optical head 202, laser light is condensed on an optical disk 201, and the track formed in the optical disk 201 in the shape of a spiral is scanned. The signal generation circuit 203 receives the electrical signal according to the reflected light from an optical disk 201 from the optical head 202. And the focal error signal which shows the condensing condition of the laser light to an optical disk 201, the tracking error signal which shows the scan condition of the track of an optical disk 201, and the regenerative signal of the data recorded on the optical disk 201 are generated. It restores to a regenerative signal with the regenerative-signal processing means 204, and data are reproduced. Moreover, both a focal error signal and a tracking error signal are inputted into a control means 206, and a control means 206 controls the optical head 202 to realize the optimal condensing condition and a track scan condition.

[0019] A tracking error signal is inputted also into the wobble signal extract circuit 207. In the wobble signal extract circuit 207, the band pass filter which passes the component for the \*\*\*\*(ed) wobble signal as shown in drawing 1, and a binary-ized circuit extract a wobble component.

[0020] The wobble period measurement means 208 is measured with the fixed standard-of-frequency clock with which the reference clock generating means 210 generates the period of the extracted wobble component. A crystal oscillator constitutes a reference clock generating means. Wobble period measurement is easily realizable by, for example, counting from the standup of the wobble signal made binary to the next standup with the counter by the reference clock.

[0021] The disk distinction means 209 distinguishes DVD-RAM2.6GB and DVD-RAM4.7GB by observing the counted value of this wobble period measurement means 208.

[0022] Next, it combines with the procedure of optical disk unit starting of the flow of distinction of a disk, a flow Fig. is shown in drawing 5, and it explains below.

[0023] First, the optical head 202 is moved near 24.5mm from near [ zone 0 ] DVD-RAM2.6GB (for example, the core of a motor shaft) as a power source is switched on where the optical disk 201 was inserted or an optical disk 201 is inserted (501) (502). In this location, it becomes the zone 0 neighborhood also by DVD-RAM4.7GB.

[0024] Next, at the engine speed of 39.78Hz in the zone 0 of DVD-RAM2.6GB, a motor 205 is rotated and an optical disk 201 is rotated (502).

[0025] Next, laser light is made to emit light (503), control of a focus is applied, and laser light is condensed on an optical disk 201 (504). Furthermore, control of tracking is applied and the truck on an optical disk 201 is made to scan laser light (505). In this condition, in a tracking error signal, as drawing 3 shows, a wobble signal appears.

[0026] In the case of DVD-RAM4.7GB [ 301 and ], at this engine speed of 39.78Hz, the wobble signal in a location with a radius of 25mm appears like 303 at the case where an optical disk 201 is DVD-RAM2.6GB. The frequency of this wobble signal is about 230kHz in about 157kHz and DVD-RAM4.7GB at DVD-RAM2.6GB. Therefore, in order to pass the signal of these bands and to remove the other component, a band pass filter band-limits in the wobble signal extract circuit 207.

[0027] An example of the property of a band pass filter is shown in drawing 4 . First, at the time of starting from which the disk is not distinguished, as shown in (4-1), the band bus filter with which 110kHz and 300kHz become a cut off frequency is constituted so that 157kHz and 230kHz may pass.

[0028] Moreover, after distinguishing the disk of DVD-RAM2.6GB and DVD-RAM4.7GB, a cut off frequency is changed to the band suitable for each. For example, in DVD-RAM2.6GB, as shown in (4-2), it is set as 110kHz and 205kHz. The rotational frequency of a motor is raised in DVD-RAM4.7GB to 58.10Hz so that it may become a standard rate, and as shown in (4-3), it is set as 220kHz and 408kHz. By this processing, the amounts of signal removal out of band, such as an eccentric component of a disk and a leakage lump of record data, become large, and the jitter of a wobble signal decreases. Therefore, clock quality can be improved when generating the clock according to a transfer rate from a wobble component.

[0029] If it is made binary after extracting the component of this wobble, it will become 302 or 304 signals, respectively.

[0030] The wobble period measurement means 208 removes the field of the address for these by the reference clock, for example, a 29.2MHz clock, and a period is measured with a counter (506). If an optical disk 201 is DVD-RAM2.6GB at this time, that measurement value will serve as about 186 counts. Moreover, if an optical disk 201 is DVD-RAM4.7GB, the measurement value will serve as about 124 counts.

[0031] The disk distinction means 209 distinguishes a disk by this counted value. For example, a threshold is considered as 155 counts, and if smaller than DVD-RAM2.6GB and it with it [ more than ], it can distinguish from DVD-RAM4.7GB (507).

[0032] Moreover, since fusibility is in the threshold of counted value, though the zone which required a focus and tracking is shifted somewhat in this way, it can distinguish easily.

[0033] As mentioned above, the disk of DVD-RAM2.6GB and DVD-RAM4.7GB can be distinguished in the phase to which a focus and tracking were applied, and it becomes possible to distinguish, even if it does not reproduce the data of the disk control area currently recorded on the disk most inner circumference.

[0034] By the result, in DVD-RAM4.7GB, all addition signals perform playback, and in DVD-RAM2.6GB, the playback system in the regenerative-signal processing means 204, for example, the playback system of the address, is changed so that it may reproduce with a differential signal. Or a setup of regenerative-signal waveform equalization is changed and the optimal waveform-equalization conditions for each disk are set up.

[0035] Such change processing can be performed at an early stage, and data playback is attained with quick equipment starting.

[0036] In addition, in the 1st old example, the engine speed of an optical disk 201 was considered as predetermined rotation, the optical head 202 was moved to the position, and the method which specifies the period of a wobble signal was described.

[0037] However, implementation is possible, even if it does not restrict to this method, it rotates an optical disk 201 at the engine speed of arbitration and the optical head 202 is located in the location of arbitration. It is realizable for this by adding the detection means of a rotational frequency, and the

location detection means of an optical head.

[0038] The detection means of a rotational frequency is realizable by measuring the period of the rotation synchronizing signal which carries out the rotation synchronization of the motor 205 by the control means 206 which controls a motor 205.

[0039] Moreover, a means to detect the location of the optical head 202 is realizable by introducing the position sensor accompanied by LED etc.

[0040] A disk can be distinguished by being able to specify how many the period of the wobble of DVD-RAM2.6GB in the engine speed of the optical disk and the location of an optical head and DVD-RAM4.7GB becomes, and changing the threshold of the distinction-means 209 of a disk by these approaches, if an engine speed and a location can be pinpointed.

[0041]

[Effect of the Invention] As explained above, according to this invention, DVD-RAM2.6GB and DVD-RAM4.7GB can be distinguished in the midst of equipment starting, without performing signal regeneration. A setup of the signal-processing means according to a disk etc. can be performed at an early stage by that cause, and it is effective for compaction of the warm-up time of equipment etc.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The wave form chart showing the wobble signal at the time of the standard rate of DVD-RAM2.6GB and DVD-RAM4.7GB

[Drawing 2] The block diagram of the optical disk unit concerning the example of this invention

[Drawing 3] The wave form chart showing the wobble signal in this engine speed of DVD-RAM2.6GB and DVD-RAM4.7GB

[Drawing 4] Drawing showing the property of the filter of a wobble signal extract means

[Drawing 5] The flow chart which shows optical disk distinction

[Description of Notations]

201 Optical Disk

202 Optical Head

203 Signal Generation Circuit

204 Regenerative-Signal Processing Circuit

205 Motor

206 Optical Head and Control Means of Motor

207 Wobble Signal Extract Circuit

208 Wobble Period Measurement Means

209 Disk Distinction Means

210 Reference Clock Generating Means

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[Translation done.]



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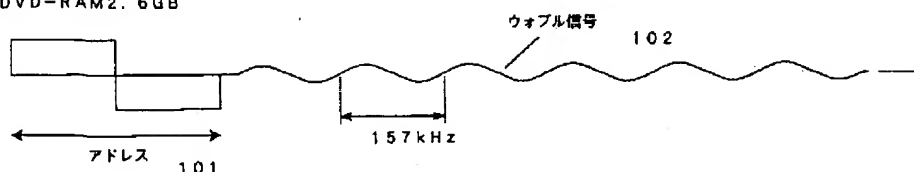
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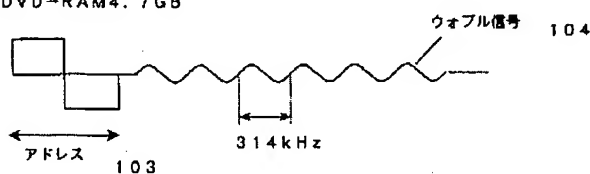
## DRAWINGS

[Drawing 1]

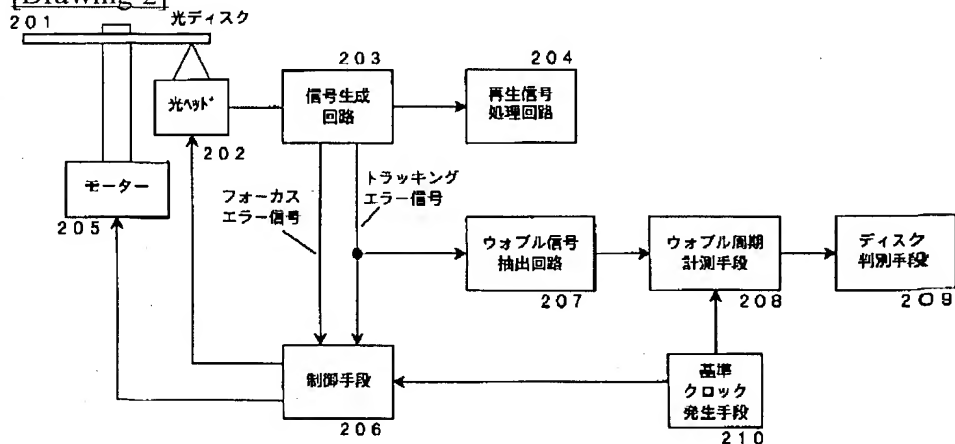
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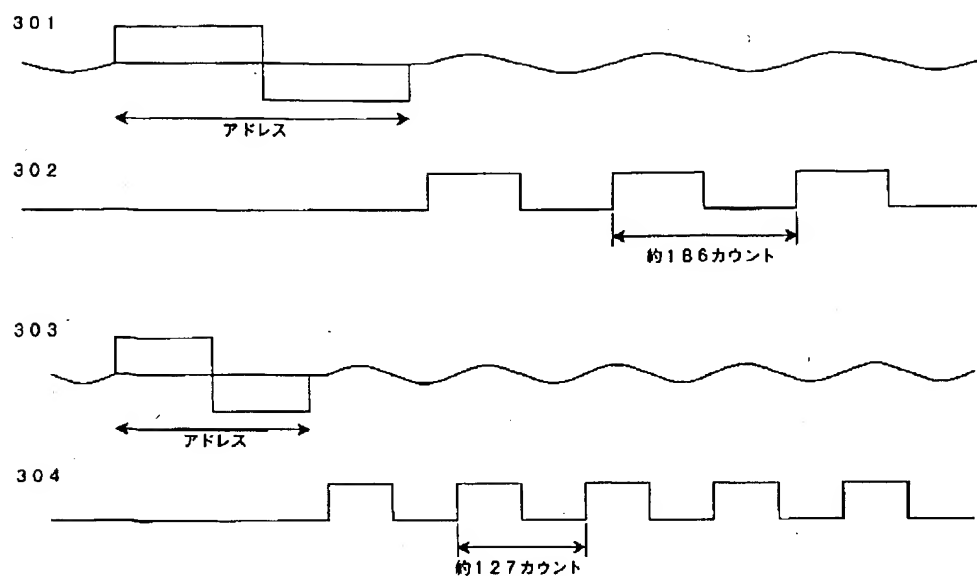
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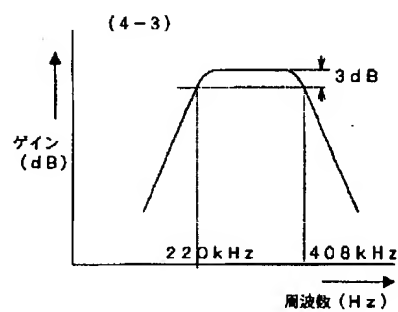
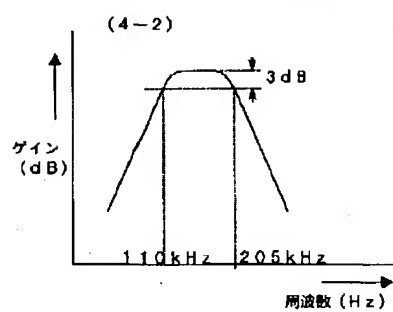
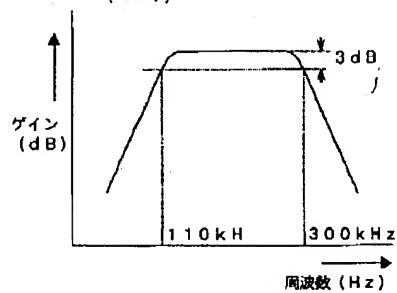
[Drawing 2]



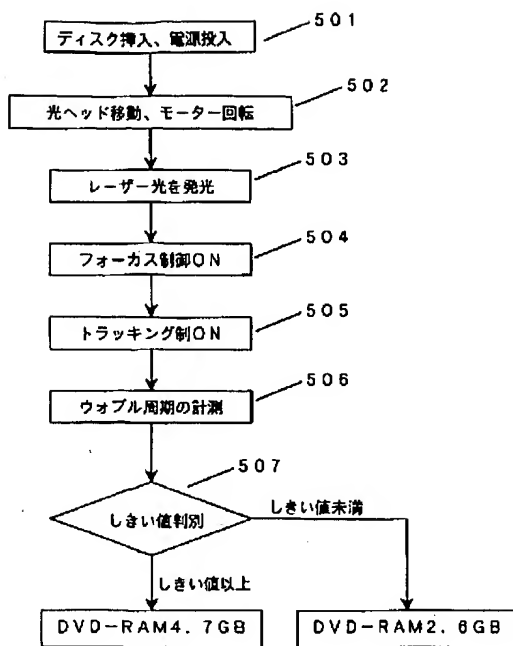
[Drawing 3]



[Drawing 4]  
(4-1)



[Drawing 5]



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